

COMMUTATOR BRUSHES

10 AND 14 TYPES

PIECE-PART DATA AND REPLACEMENT PROCEDURES

1. GENERAL

1.01 This section covers the information necessary for ordering parts to be used in the maintenance of 10- and 14-type commutator brushes. It also covers approved procedures for replacing these parts.

1.02 This section is reissued to add a paragraph covering the use of the P-13B114 wiper pad, to revise the description of the P-15A301 wiper pad, to add the description of the information enclosed in parentheses, to revise piece-part data for 14-type brush and commutator wiper, and to revise the replacement procedures for the wiper holder and associated parts to refer to Section 069-610-801.

1.03 Part 2 of this section covers the piece-part numbers and the corresponding names of the parts which it is practicable to replace in the field in the maintenance of 10- and 14-type commutator brushes. No attempt should be made to replace parts not designated. Part 2 also contains explanatory figures showing the different parts. This information is called Piece-Part Data.

1.04 Part 3 of this section covers the approved procedures for the replacement of the parts listed under Part 2. This information is called Replacement Procedures.

1.05 Before making any replacement of the parts of a commutator brush, make busy the associated circuit and the two adjacent circuits in the approved manner and, if necessary, block the relays operated or nonoperated to permit raising the brush rod.

1.06 Commutator Brush Guides

(a) The P-463341 guide (rear) is provided to compensate for wear of the rear guiding surfaces of all commutator brush frames. Where the guide is installed on brush frames not equipped with phosphor-bronze guide studs, it will be necessary to insert a P-42A230 shim in the guide to prevent the guide from shorting commutator segments.

(b) The P-290264 guide (auxiliary) is intended to be added to 10- or 14-type commutator brushes to overcome the condition where the degree of wear at the front guide surface of the brush frame is such that the frame or spring assembly screw may contact the commutator segments. When interference exists between the auxiliary guide and the commutator, see 3.21 or 3.22.

1.07 Before making any replacement of parts of a commutator brush of a link circuit having nontripping-type multiple brushes, proceed as follows. Separate the springs of each multiple brush on the rod, so that they will not contact the multiple bank terminals, as covered in 3.38. This will prevent interference with working circuits connected to the multiple bank terminals.

1.08 *P-15A301 Wiper Pad:* Later silicone-impregnated P-15A301 wiper pads have a blue color. Earlier P-15A301 wiper pads have an orange color.

1.09 *P-13B114 Wiper Pad:* Dry P-13B114 wiper pads have a white color and should be used to replace P-15A301 wiper pads where,

→the condition of the commutator appears to be
→excessively oily as covered in Section 069-610-801.

2. PIECE-PART DATA

2.01 The figures included in this part show the various parts in their proper relation to the other parts of the commutator brush. The piece-part numbers of the various parts are given together with the names of the parts as listed by the Western Electric Merchandise Department.

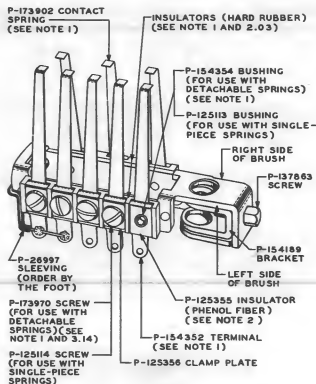
2.02 When ordering piece parts for replacement purposes, give both the piece-part number and the name of the part, for example, P-125355 Insulator. Do not refer to the BSP number or to any information shown in parentheses following the piece-part numbers.

2.03 Information enclosed in parentheses () is not ordering information. This information may be references to notes, parts referred to in other portions of the section and not considered replaceable, or part names in general use in the field if these names differ from those assigned by the manufacturer.

2.04 The following is a list of numbers and corresponding names of piece parts which are not common to all commutator brushes.

BRUSH CODE NO.	FIG. NO.	SIDE OF BRUSH	INSULATOR PIECE-PART NO.
10A	1	Left	P-154296
	1	Right	P-154473
10B	1	Left	P-159727
	1	Right	P-154473
10C	1	Left	P-159727
	1	Right	P-154356
14A	2,3	Left	P-159727
	2,3	Right	P-154356
14B	2,3	Left	P-159727
	2,3	Right	P-154473

BRUSH CODE NO.	FIG. NO.	SIDE OF BRUSH	INSULATOR PIECE-PART NO.
14C	2,3	Left	P-154296
	2,3	Right	P-154473
14E	2,3	Left	P-159727
	2,3	Right	P-159712



Note 1: If a single-piece spring is to be replaced by a detachable spring, order P-173902 contact springs, P-154352 terminals, P-173970 screws, insulator as covered in 2.04, and P-154354 bushings, and replace all of the aforementioned parts on that side of the brush. Detachable springs should not be installed on the hard-rubber insulating block used with single-piece springs.

Note 2: When replacing a contact spring and the insulator mounted under the spring is of hard rubber, also replace the insulator by P-125355 insulator.

Fig. 1 — General Design of 10-Type Brush

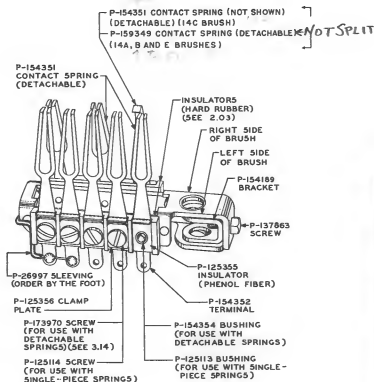


Fig. 2 - General Design of 14-Type Brush

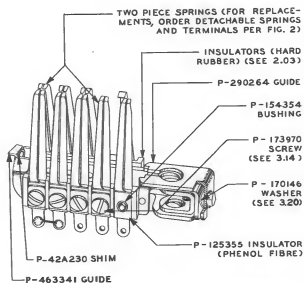


Fig. 3 - Auxiliary Commutator Brush Guides for 10- and 14-Type Brushes and Parts Associated With 2-Piece Springs



Fig. 4 - Commutator Latch Parts

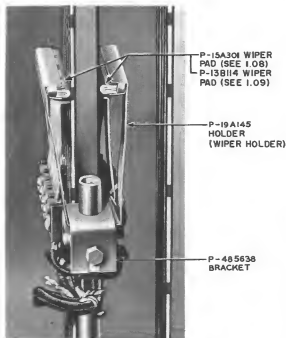


Fig. 5 - Commutator Wiper Parts

3. REPLACEMENT PROCEDURES

3.01 List of Tools and Materials

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
206	30-Degree Offset Screwdriver
207	90-Degree Offset Screwdriver
240	Scriber
308	Brush Spring Crimper
376A	Dental Mirror
400A	Commutator Brush Spacer

SECTION 026-120-801

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
555A	3/16-Inch Hex. Single-End Socket Wrench
613A	Clamp
619A	Adjuster
621A	Spreader
677A	Commutator Guide Mounting Tool
KS-6320	Orange Stick
R-1051	Pillar File
→	Long-Nose Pliers (or the replaced 6-1/2 inch P-long-nose pliers)
→	3-Inch C Screwdriver (or the replaced 3-inch cabinet screwdriver)
MATERIALS	
P-475817 (as reqd)	Shell (shell of a 309 plug) or Equivalent

General

3.02 No replacement procedures are specified for screws or other parts where the procedure consists of a simple operation.

3.03 After making any replacement of parts of a commutator brush, the part or parts replaced shall meet the readjust requirements involved as covered in Section 026-120-701. Other parts whose adjustments may have been directly disturbed by the replacement operations shall be checked to the readjust requirements, and an over-all operation check shall be made of the commutator brush before restoring the circuit to service. Inspect the wiring of the commutator and the commutator brushes for loose or broken connections and for correct dress. Also check to see that the horizontal alignment of the multiple brushes is satisfactory as covered in the section covering the type of brush involved.

3.04 Mounting 613A Clamp: Fig. 6 — Raise the brush rod sufficiently to permit mounting the clamp. To mount the clamp, proceed as follows. From the right of the brush rod, hook the clamp behind the rod just below the commutator brush frame. Raise the clamp against

the frame so that the front projection on the clamp engages the front surface of the frame directly under the brush frame clamping screw. Pull the lower end of the clamp spring forward and position it on the front surface of the brush rod. Make sure that the end of the spring is centered on the rod and holds the clamp firmly in place. The clamp will hold the brush frame in position when the brush frame clamping screw is loosened.

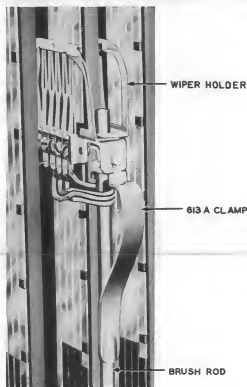


Fig. 6 — 613A Clamp Mounted in Position on Brush Rod

3.05 Mounting and Removing 621A Spreader:

Fig. 7 — When a wiper holder is mounted on a brush and it is necessary to gain access to the parts for replacement purposes, mount the 621A spreader on the brush as follows. Grasp the spreader by the triangular handles and position the legs of the spreader above the wiper holder with the stop of the spreader resting against the front edge of the commutator. Press the triangular handles together so that the tips of the legs are flat against the commutator. Slide

the spreader downward until the offset portion of the leg tips rests against the top portion of the wiper holder. Release the pressure on the triangular handle. To remove the spreader, proceed as follows. Press the triangular handles together so that the leg tips lay flat against the commutator. Slide the spreader upward until the legs are free of the pads, and then release the pressure on the handles and remove the spreader.

Wiper Holder and Associated Parts

3.06 General: Before replacing a wiper pad, clean the commutator, if necessary, as covered in Section 069-610-801. Before replacing a wiper holder, in addition to the circuits made busy as covered in 1.05, also make busy the circuits of the three commutators directly behind these.

3.07 Wiper Pads: To replace a wiper pad, move one side of the holder away from the commutator, grasp the lower front corner

of the metal clip of the wiper pad assembly with the long-nose pliers applied from the underside of the pad, and remove the wiper pad. **Do not grasp the cloth pad.** Take care when doing this not to deflect the holder more than is necessary, as this might reduce the tension of the holder.

3.08 Insert a wiper pad at each side of the wiper holder as shown in Fig. 5. To do this, move one side of the holder away from the commutator with the KS-6320 orange stick just enough to permit insertion of the pad. Grasp one end of the pad with the fingers and carefully insert the pad into the holder from the front. Take care not to move the holder away from the commutator more than necessary, as this might reduce the tension of the holder. After working on the commutators, check the commutator brush requirements. It is also very important to check the requirements covering pressure of wiper pad against commutator and movement of ends of wiper holder. These requirements are covered in Section 026-120-701.

3.09 After installing silicone-impregnated pads on circuits that rarely drive the brush rod to the telltale or topmost position, run the brush rod up and down once. This will insure that some silicone fluid reaches the upper surfaces of these commutators.

3.10 Wiper Holder: To replace a wiper holder, mount the 613A clamp as covered in 3.04. Loosen the brush frame clamping screw with the 555A wrench and remove the bracket or front guide. Using the 619A adjuster, depress the strap wire extending across the rear of the commutator. To remove the holder, slip the split ends of the holder over the brush rod and push the holder to the rear. Before mounting a new wiper holder on frames not equipped with rear guides, check the rear of the brush frame and guide studs for wear. If they are reaching a point where trouble might be experienced, give consideration to mounting a P-463341 guide as covered in 3.24 through 3.27. To mount a new wiper holder, grasp one of the legs at the split end with the long-nose pliers as shown in Fig. 8. Insert the holder at one side of the commutator around which it is to be placed so that the split end of the holder is at the rear of the commutator. Then, using the KS-6320 orange stick, spread the legs of the holder just enough

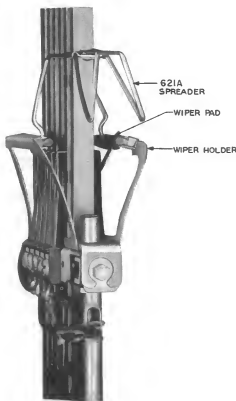


Fig. 7 - Method of Installing 621A Spreader

to place the holder around the commutator. Draw the holder forward and lower it so that the rear of the holder rests on the brush frame or rear guide, when provided, and the front of the holder is on the top of the brush rod. When the brush frame is not equipped with a rear guide, proceed as covered in 3.11 and 3.13; when it is equipped with a rear guide, proceed as covered in 3.12 and 3.13.

3.11 Brush Frames Not Equipped With Rear

Guides: First place the left leg of the wiper holder over the brush rod and then the right leg as shown in Fig. 6. With the legs positioned on the rod, place the finger at the top of each side of the holder toward the rear. Press down equally on both sides until the triangular projection on the inside of the holder slips over the rear of the brush frame and snaps in place underneath the frame. In this position the ears on the inside of the holder should rest on the top surface of the brush frame. Check this by using the 376A dental mirror. Then proceed as covered in 3.13.

3.12 Brush Frames Equipped With Rear

Guides: With the wiper holder resting on the rear guide and rod as covered in 3.10, hold the feet of the front legs of the wiper holder against the front edge of the commutator. Place a finger at the top of each side of

the holder toward the rear and press down equally on both sides until the triangular projections (see Fig. 8) and the two ears on the inside of the holder slip over the tab of the rear guide. Then proceed as covered in 3.13. Using the 376A dental mirror, make sure that the triangular projection on the holder engages the undersurface of the commutator brush frame through the slot in the rear guide.

3.13 All Brush Frames:

After the wiper holder is in place as covered in 3.11 or 3.12, remount the guide or bracket, whichever was used, over the feet of the holder. In either case, press the guide or bracket down firmly against the feet of the wiper holder. Move the legs of the wiper holder away from the brush rod to take up any play in the mounting holes. With the legs in this position, securely tighten the brush clamping screw. Positioning the legs of the wiper holder in the extreme outward position will prevent their shifting in service. Remove the 613A clamp. Install the wiper pad as covered in 3.08 and 3.09. With the 619A adjuster, move the rear strap back to its original position close to the legs of the wiper holder. Check this position with the 376A dental mirror. Check that the requirements covering clearance between the tip of the brushes and the underside of the wiper holder as covered in Section 026-120-701 are met.

Contact Springs and Associated Parts

3.14 Later 10- and 14-Type Brushes (Later 10-

and 14-type brushes are equipped with detachable contact springs.): On these brushes the contact springs and soldering terminals are separate parts. This facilitates removing the spring and avoids the necessity of unsoldering the wires. Where the commutator brush is equipped with a wiper holder, mount the 613A clamp and 621A spreader on the brush as covered in 3.04 and 3.05, respectively. Loosen the spring assembly screw with the 206 and 207 offset screwdrivers, after which the contact spring can be removed. Substitute the new part and securely tighten the assembly screw. If the screw protrudes beyond the inside surface of the brush frame, proceed as covered in 3.16. If the clamp and spreader were used, remove the spreader at this time as covered in 3.05 and then the clamp.

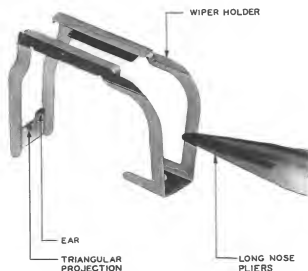


Fig. 8 — Grasping Wiper Holder With Long-Nose Pliers

3.15 Earlier 10- and 14-Type Brushes: On these brushes, the soldering terminals are part of the contact springs and it is necessary to unsolder the wires and remove the spring assembly screw to remove the contact spring. The contact springs at the front of the brush may be removed by removing the assembly screws with the 206 and 207 offset screwdrivers without disengaging the commutator from the frame. However, to replace the contact springs at the rear of the brush, it will be necessary to disengage the commutator and dismount the brush. Replacement contact springs for 10- and 14-type brushes are of the detachable type and, if it is necessary to dismount the brush in order to replace the spring at fault, give consideration to replacing all springs on the brush with new ones of the detachable type. To dismount the brush and replace these springs, proceed as follows.

(a) Make sure that the brush rod is in the down position and insert the 400A commutator brush spacer between the springs and the commutator just above the frame of the brush. Then raise the spacer to the tips of the springs as shown in Fig. 9.

(b) Scribe a line on the brush rod with the 240 scriber to indicate the position of the commutator brush. Then loosen the brush clamping screw with the 555A wrench sufficiently to permit raising the commutator brush on the brush rod. On brush rods where the commutator brush wiring comes out of the top of the rod, it will be necessary to unsolder the wiring from the brush. On brush rods where the wiring comes out of an eyelet just below the brush, it will not be necessary to unsolder the wires. Slide the brush upward until it is free from the brush rod.

(c) On 300-point line finder frames, disconnect the compensator tape clamp from the rod, noting the position of the clamp by scribing a mark on the rod with the 240 scriber.

(d) Loosen the latch plate and top brush rod bearing clamping screws with the 3-inch C screwdriver and remove the latch plate and bearing.

(e) Move the top of the commutator forward to disengage the notch at the top cross member, raise the commutator until the bottom end is free from the frame, and then

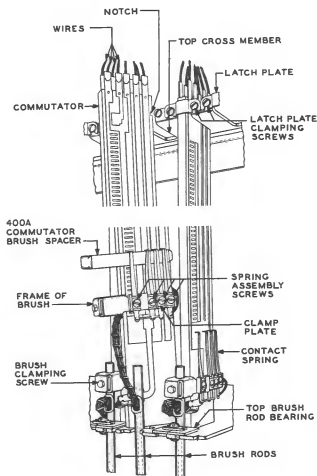


Fig. 9 - Positions of the Commutator and the 400A Commutator Brush Spacer When Replacing Parts of a Commutator Brush

move the whole commutator and brush assembly forward until the commutator brush is free from the other commutators as shown in Fig. 9.

(f) Loosen and remove the spring assembly screw with the 3-inch C screwdriver, make the necessary replacement of parts in the assembly, and then insert the spring assembly screw, tightening it just enough to hold the parts in place. If the screw protrudes beyond the inside surface of the brush frame, proceed as covered in 3.16.

(g) Remount the commutator latch plate and top brush bearing plates. Tighten the clamping screws and locate the commutator brush in its original position as indicated by

the line scribed on the brush rod. Tighten the brush clamping screw.

- (h) Attach the compensator tape clamp in the case of 300-point line finders.
- (i) Remove the 400A commutator brush spacer. If the B spring of a brush associated with the 3G commutator is replaced, crimp the new B spring as covered in 3.33 or 3.34.
- (j) If the M and G springs of a brush associated with the 2A, 2B, 5A, and 5B commutators are replaced and the circuit is not provided with contact protection for M and G segments, crimp the M spring as covered in 3.35 and ground the C spring as covered in 3.37.

3.16 Spring Assembly Screws: When replacing a spring assembly screw, check that the end does not protrude beyond the inside surface of the brush frame. Where it does, remove the screw and file the end with the R-1051 file until the end is flush with the brush frame when the screw is in place.

3.17 Bushing, Phenol Fiber Insulator, Soldering Terminal, and Clamp Plate: To replace these parts, remove the assembly clamping screw and the contact spring, substitute the necessary new parts, and reassemble as covered in 3.15.

3.18 Hard-Rubber Insulator: To replace a hard-rubber insulator, disengage the commutator from the frame as covered in 3.15. Then scribe the springs along the top of the hard-rubber insulator with the 240 scriber so that they may be placed in their correct positions when the brush is reassembled. With the 3-inch C screwdriver, loosen and remove the spring assembly screws holding the insulator to the mounting bracket. Separate the springs and bushings from the insulator and remove the insulator. Replace the old insulator with a new one, being careful to see that all the assemblies are complete with bushing, contact spring, phenol fiber insulator, clamp, and assembly screw. Then insert and tighten the spring assembly screws. Reassemble the brush and commutator in their original positions as covered in 3.15.

3.19 Commutator Brush: To replace a commutator brush, proceed as follows. Where the brush is equipped with a wiper holder, remove the holder as covered in 3.10. Then remove the commutator brush from the brush rod as covered in 3.15 and disconnect it from the cable by unsoldering the wires. Unsolder the wire from the bottom commutator lug and slip the old brush off the bottom of the commutator. Place the 400A commutator brush spacer between the springs of the new brush, slip it on the commutator, and resolder the wires to the correct contact springs and to the commutator lug. If the brush is associated with the 3G commutator, crimp the B spring as covered in 3.33 or 3.34. If the brush is associated with a 2A, 2B, 5A, or 5B commutator of a line finder circuit and the circuit is not provided with contact protection for M and G segments, crimp the M spring as covered in 3.35 and ground the C spring as covered in 3.37. Remount the wiper holder if it was removed as covered in 3.10.

Brush Clamping Bracket

3.20 Replacing Brush Clamping Bracket: Remove the brush from the rod, as covered in 3.15. Remove the brush clamping screw with the 555A wrench. Remove the bracket. Substitute a new bracket and remount the brush and the commutator in their original positions as covered in 3.15.

Auxiliary Commutator Brush Guide

3.21 Where Wiper Holder Is Not Furnished: To install an auxiliary brush guide, mount the 613A clamp as covered in 3.04. Loosen the brush clamping screw, turning it out two or three turns with the 555A wrench. Then place the auxiliary guide over the top of the brush rod and slide it down on top of the brush frame into the position shown in Fig. 3. On brush rods where the commutator brush wiring comes out of the top of the rod, it will be necessary to raise the ferrule, if provided, and work the wires into the guide. On 300-point line finder frames, remove the compensator tape clamp from the brush rod as covered in 3.15. Hold the guide firmly against the brush frame and securely tighten the brush clamping screw. Remount the compensator tape clamp if removed. If interference occurs between the guide and commutator, place a P-170146 washer (shown in Fig. 3) on the brush clamping screw between the brush

frame and guide. To do this, it will be necessary to remove the clamping screw from the brush frame and place the washer in position. Then reinsert and securely tighten the screw. Remove the 613A clamp. Check the requirements applying to the position of the commutator brush springs specified for this apparatus in Section 026-120-701.

3.22 Where Wiper Holder Is Furnished:

Mount the 613A clamp as covered in 3.04. Loosen the brush clamping screw, turning it out two or three turns with the 555A wrench. Remove the wiper holder P-485638 clamping bracket. Then place the auxiliary guide over the top of the wiper holder feet. On brush rods where the commutator brush wiring comes out of the top of the rod, it will be necessary to raise the ferrule if provided and work the wires into the guide. Move the legs of the wiper holder away from the brush rod to take up any play in the mounting holes. Hold the guide firmly against the brush frame and wiper feet and securely tighten the brush clamping screw. If interference occurs between the guide and commutator, place a P-170146 washer (shown in Fig. 3) on the brush clamping screw between the brush frame and guide. To do this, it will be necessary to remove the clamping screw from the brush frame and place the washer in position. Then insert and securely tighten the screw. Remove the 613A clamp. Check the requirements applying to the position of the commutator brush springs and the pressure of the wiper pad against the commutator as covered in Section 026-120-701.

Installing Guide on Rear of Commutator Brush Frame

3.23 General: Where the brush frame is equipped with a wiper holder, remove the holder as covered in 3.10. Where it is not so equipped, raise the brush rod so that the commutator brush is approximately in the middle of the commutator. Where the springs on the commutator brush are strapped at the rear, move the strap away from the commutator with the 619A adjuster.

3.24 Check whether the brush frame is equipped with phosphor-bronze guide studs. If the brush frame is equipped with studs, proceed as covered in 3.26 through 3.28. Where the brush frame is not equipped with studs, insert a P-42A230 shim in the guide as

covered in 3.25 and then proceed as covered in 3.26 through 3.28.

3.25 Hold the ears of the guide between the thumb and middle finger with the tab of the guide at the top and toward the hand. With the other hand, hold the hooked leg of P-42A230 shim between the thumb and middle finger with the closed portion at the top. Insert the long leg of the shim so that it is positioned in the corner formed by one of the ears and the back portion of the guide. The end of the long leg should rest on one of the jaws. Position the hooked portion of the other leg so that it rests on the rounded edge of the other ear. **Do not attempt to push the hooked portion over the rounded edge of the ear at this time.** With the index finger of the hand holding the guide, hold the shim in this position to prevent it snapping out of the guide. With the 3-inch C screwdriver, push the hooked portion of the leg over the rounded edge of the ear until this leg is against the back portion of the guide. Check that both legs of the shim rest on the back portion of the guide and the shim is in position as shown in Fig. 10.

3.26 Insert the tab of the guide into the slot in the offset end of the 677A commutator guide mounting tool as shown in Fig. 11.

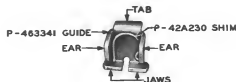


Fig. 10 - Position of Shim When Inserted in Guide

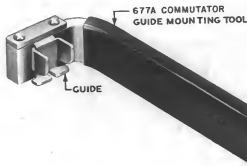


Fig. 11 - Position of Guide When Inserted in 677A Commutator Guide Mounting Tool

3.27 Insert the 677A commutator guide mounting tool and guide to the right and above the commutator brush on which the guide is to be mounted. Position the jaws of the guide against the undersurface of the commutator brush frame. Holding the tool in a horizontal position parallel to the surface of the commutator as shown in Fig. 12, pull the tool outward forcing the guide in position. Push the tool in the opposite direction to disengage it from the guide and withdraw the tool.

3.28 Where a wiper holder has been removed, remount it as covered in 3.10 through 3.13. Where the commutator is not equipped with a wiper holder, move the rear strap, if provided, back to its original position using the 619A adjuster. In all cases return to service the circuits made busy.

Removing and Replacing a Guide on Rear of Commutator Brush Frame

3.29 General: In addition to the circuits made busy as covered in 1.05, also make busy the circuit associated with the brush frame directly behind the frame on which work is to be done.



Fig. 12—Mounting Guide on Commutator Brush With 677A Commutator Guide Mounting Tool

3.30 Raise the brush rod so that the commutator brush on which the guide is mounted is approximately in the middle of the commutator.

3.31 Where the brush frame is equipped with a wiper holder, remove the holder as covered in 3.10. Where a holder is not furnished but where the springs on the commutator brush are strapped at the rear, move the strap away with the 619A adjuster.

3.32 Insert the long-nose pliers to the right of the commutator directly behind the commutator brush from which the guide is to be removed. Grasp the tab of the guide with the pliers. Exercise care to hold the tab firmly in order not to drop it. Pull the guide upward to remove it from the brush frame. Substitute a new guide as covered in 3.24 through 3.28.

Crimping Contact Springs

3.33 B Spring of Brushes Used With the 3G Commutator (where wiper is not furnished): To meet the requirements covering the setting of the B brush spring on the commutator, crimp the B spring as follows. With the brush in the normal or down position, grasp the 308 brush spring crimper loosely in the right hand and introduce the straight jaw between the front spring of the brush and the right-hand side of the commutator about 1/8 inch below the contact portion of the spring. Hold the tool so that the jaw is parallel to the surface of the commutator and thrust it to the rear as far as it will go. Then lower it until its locating pin rests on the top of the frame and its shoulder rests against the front edge of the commutator as shown in Fig. 13. Holding the tool so that the jaws are horizontal, close the jaws steadily and firmly to a complete stop so that the crimp is formed and the portion of the spring above the crimp lies in the same plane as the portion below it. Make sure that the spring is located properly as covered in Section 026-120-701.

3.34 B Spring of Brushes Used With the 3G Commutator (where wiper holder is furnished): To meet the requirements covering the setting of the B brush spring on the commutator, crimp the B spring as follows. Mount the 621A

spreader as covered in 3.05. Loosen the spring assembly screw of the B spring with the 206 and 207 offset screwdrivers and remove the spring. Hold the spring in a horizontal position with the contact tip down. Then with the 308 brush spring crimper held loosely in the hand with the straight jaws down, insert the spring between the jaws so that they are approximately 3/16 inch from the contact end of the spring and the spring lies within the crimping portion of the tool. Hold the tool so that the jaws are at right angles to the longitudinal axis of the spring. Then close the tool steadily and firmly to a complete stop so that the crimp is formed and the portion to the right lies in the same plane as the portion to the left. Reassemble the spring and securely tighten the spring assembly screw. Remove the spreader as covered in 3.05. Make sure that the spring is located properly as covered in Section 026-120-701.

3.35 M Spring Used With 2A, 2B, 5A, and 5B Commutators (circuit not provided with contact protection on M and G segments): Where pitting or burning of the M commutator segment is experienced in the normal position, the condition can be minimized by crimping the M spring of the brush. Where the spring is a split-leaf type, remove it as covered in 3.15. Substitute one of the forked type and then proceed as covered in 3.14. Where the spring is a forked type and it is in good condition, remove the spring as covered in 3.15 and proceed as covered

in 3.36. If the forked-type spring is in poor condition, replace it with a new spring as covered in 3.36 and mount it in place as follows.

3.36 Hold the 308 brush spring crimper in the right hand with the straight jaw downward. Insert the spring at right angles to the jaws, contact tip downward, between the jaws and the crimper approximately 15/16 inch from the contact end. Close the jaws steadily and firmly until a crimp is formed and the portion on the right of the crimp lies in the same plane as the portion on the left. Securely mount the crimped spring in place as covered in 3.15. Check that the spring is satisfactorily positioned as covered in Section 026-120-701. Remove the spreader if it was used as covered in 3.05.

Grounding Springs

3.37 C Spring of Line Finder Brushes Used With 2A, 2B, 5A, and 5B Commutators (circuit not provided with contact protection): Where pitting of the G commutator is experienced in the normal position, the condition can be minimized by grounding the C spring to the brush frame as follows. Remove the spring assembly screw of the C commutator brush spring with the 206 and 207 offset screwdrivers and remove the clamp plate, insulator, and bushing. Discard the bushing and insulator. Substitute a P-125356 clamp plate for the discarded insulator. Remount the two clamp plates and securely tighten the spring assembly screw.

3.38 Before making any replacements of parts of a commutator brush of a link circuit having nontripping-type multiple brushes, proceed as follows. Raise the brush rod until the multiple brush is in a position away from the brushes on the adjacent rods. Hold the P-475817 shell in a vertical position and insert it between the sleeve springs of the multiple brush and into the crook formed by the springs before the contact portion of springs so as to hold the brush shoes away from contact with the bank terminals. This operation may be facilitated if the KS-6320 orange stick is inserted into the hole of the plug shell and is used as an aid in positioning the shell. After making the replacements, remove the plug shell from the multiple brush.

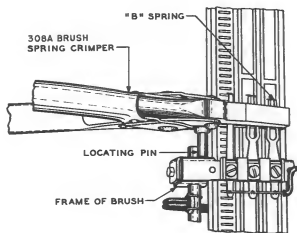


Fig. 13 — Method of Crimping the B Spring With the 308A Brush Spring Crimper

REASONS FOR REISSUE

1. To revise the paragraph describing the P-15A301 wiper pad (1.08).
2. To add a paragraph covering the use of the P-13B114 wiper pad (1.09).
3. To add a paragraph defining the information enclosed in parentheses (2.03).
4. To revise the piece-part data for the contact spring (Fig. 2).
5. To revise the piece-part data for the wiper pad (Fig. 5).
6. To revise the List of Tools and Materials (3.01).
7. To revise the procedure for the wiper holder and associated parts (3.06).